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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 09/855,208
Filing Date: May 14, 2001
Appellant(s): JENSEN ET AL.

Mr. Michael J. D'Aurelio
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed June 20, 2005 appealing from the Office Action mailed December 28, 2004.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

U.S. Patent No. 5,902,994 to Lisson et al.

U.S. Patent No. 4,945,225 to Gamgee et al.

U.S. Patent No. 6,642,492 to Shiota et al.

U.S. Patent No. 4,982,203 to Uebbing et al.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-4, 7-10, 13-16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,902,994 to Lisson et al. in view of U.S. Patent No. 4,945,225 to Gamgee and U.S. Patent No. 6,642,492 to Shiota et al.

Lisson teaches an apparatus for calibrating a linear image sensor such as an array of sensors of a charge coupled device (column 1, lines 10-12) in a scanning apparatus (column 3, lines 1-2) including a light source (column 2, lines 61-63) controlled by a corresponding control circuit for applying first and second intensities of the light source at first and second times (column 3, lines 12-13) through the

altering of voltage or current levels applied to the light source by predefined amounts (column 3, lines 42-45) to sequence the intensity of the of the light source from zero amplitude to a maximum level causing the image sensor to saturate (column 3, lines 45-49), wherein the image sensor array produces a corresponding first and second outputs based on the source intensity (column 3, lines 20-27).

While Lisson does disclose that altered currents are supplied by a control circuit to step the intensity of a light source until the saturation of the light sensor, Lisson does not specifically include a corresponding means for determining the occurrence of the saturation or specify that the image sensor be part of a scanner apparatus comprising a processor and memory for incrementing and decrementing the driving source of an LED as the light source.

Gamgee teaches a signal discriminator including a light source and a sensing optical detector circuit that produces an output corresponding to the intensity of the light source (column 3, lines 16-25) wherein saturation of the sensing optical detector circuit is detected by producing first and second magnitude outputs, at first and second times, related to first and second light source intensities (column 2, lines 49-58) and determining when a difference between the first and second outputs are not significant as compared to a predetermined significance value/threshold (column 2, line 65 to column 3, line 11).

Shiota teaches a calibration apparatus for light emitting elements in an optical scanning printer (column 1, line 66 to column 2, line 2) comprising an optical head including an LED light source (column 3, lines 7-12) a memory storage device, a

driving control logic circuit coupled to the LED light source (column 4, lines 62-65), and a processing logic circuit (column 5, line 26) wherein the LED light source is incremented and decremented predetermined amounts by a driving source to control the intensity of emitted light (column 5, lines 5-10) in accordance with the processing circuit and memory storage device logic in order to obtain the light source at a desired intensity/brightness (column 6, lines 20-25). Shiota also teaches comparing a sensor output to a threshold to determine when the output reaches a desired value (column 5, lines 30-36).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lisson to include a corresponding means for determining the occurrence of the saturation or specify that the image sensor be part of a scanner with an LED as the light source, as taught by Gamgee, because Lisson teaches altering a current supplied to a light source until saturation is detected, but provides no method for determining such saturation and the invention of Gamgee suggests that the combination would have provided a method for determining the saturation when an intensity is altered up to a saturation point (column 1, lines 61-64) by employing a common relationship (column 1, lines 64-68) thereby accurate determination of when the maximum intensity has been reached.

It would have been obvious to one having ordinary skill in the art to modify the invention of Lisson to include a processor and memory for incrementing and decrementing the driving source of an LED as the light source, as taught by Shiota, because the invention of Lisson teaches altering the driving current of a light source

up to a maximum value and Shiota suggests that the combination would have provided a corresponding method for providing complete control for adjusting the driving source until the intensity output reaches a desired optimum value (column 5, lines 30-41 and 52-61).

Claims 5, 6, 11, 12, 17, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lisson et al. in view of Gamgee and Shiota et al. and further in view of U.S. Patent No. 4,982,203 to Uebbing et al.

As noted above, Lisson in combination with Gamgee and Shiota teaches many of the features of the claimed invention, and while combination teaches incrementing/decrementing the current in order to obtain an optimum value, the combination does not specifically teach determining the amount the current is to be changed using percentages.

Uebbing teaches a method and apparatus for improving the uniformity of an LED printhead by compensating for the degradation in light output of a plurality of LEDs (column 4, lines 66-68) comprising obtaining the light output measures of two different pulse-width values and comparing the difference between these values to determine the percentage increase, of the second measure relative the first measure, needed to meet the desired output level deviation/difference (column 5, lines 1-22).

It would have been obvious to one having ordinary skill in the art to modify the invention of Lisson, Gamgee, and Shiota to include determining the amount the

current is to be changed using percentages, as taught by Uebbing, because Uebbing suggests a method that would quickly and accurately determine the required change in intensity, and corresponding current modification, using a functionally equivalent method in order to adjust the light output to the optimum/desired value of Lisson, Gamgee, and Shiota (column 5, lines 1-32).

(10) Response to Argument

Appellant first argues:

"in the First Office Action and the Final Office Action, the Examiner's cited column 2, lines 49-58 of Gamgee as showing or suggesting 'wherein saturation of the sensing optical detector circuit is detected by producing first and second magnitude outputs, at first and second times, relating to first and second light source intensities (col. 2, lines 49-58)' as set forth above. Then, in the 'Response to Arguments' on page 6 of the Final Office Action, the Examiner states that the cited portion of Gamgee was relied upon by the Examiner to teach the simple fact that the detector circuit produces magnitude outputs related to incident light source. Applicants object to the apparent revision in the interpretation of Gamgee in this respect. Applicants' response to the Office Action of June 15, 2004 was predicated upon the rejection as stated."

The Examiner asserts that the First and Final Office Actions specifically stated:

"Gamgee teaches a signal discriminator including a light source and a sensing optical detector circuit that produces an output corresponding to the intensity of the light source (column 3, lines 16-25) wherein saturation of the sensing optical detector circuit is detected by producing first and second magnitude outputs, at first and second times, related to first and second light source intensities (column 2, lines 49-58) and determining when a difference between the first and second outputs are not significant as compared to a predetermined significance value/threshold (column 2, line 65 to column 3, line 11)."

In this paragraph, column 2, lines 49-58 is cited to teach the feature of "related to first and second light source intensities" and column 2, line 64 to column 3, line 11 is cited to teach "wherein saturation of the sensing optical detector circuit is detected

by producing first and second magnitude outputs, at first and second times, and determining when a different between the first and second outputs are not significant as compared to a predetermined significance value/threshold."

Appellant then argues:

"Applicants have explained that Gamgee fails to show producing first and second magnitude outputs at first and second times as set forth in claim 1. Specifically, Gamgee further states in column 1, lines 10-27...As described above, the circuit of Gamgee is employed to identify objects such as people and animals. In this respect, the signals are continuous analog type signals, not specific readings taken at discrete times as set forth, for example, in claim 1."

Gamgee's teaching of producing first and second magnitude outputs at first and second times will be explained below in response to Appellant's interpretation of column 2, line 65 to column 3, line 11.

Appellant then argues that in column 2, line 65 to column 3, line 11:

"Gamgee discusses discrimination between an information component and a background or noise component in the same signal. There are not two measures of light output of an LED that are taken at different periods of time as described in claim 1. In addition, there is no comparison between a first measure of light output and a second measure of a light output with a predefined different threshold. In fact, no comparison is performed. Accordingly, Applicants assert that the element of 'detecting a saturation of the sensors in the sensor array by comparing the difference between the first measure of the light output and the second measure of the light output with a predefined threshold' as set forth in claim 1 is not shown or suggested by Gamgee."

Appellant argues the Examiner's interpretation of column 2, line 65 to column 3, line 11, stating:

"the language of Gamgee cited by the Examiner merely evidences that the fact that Gamgee recognizes that sensors must operate in a relative operating range in

order to provide reliable readings. In this manner, circuitry is employed to ensure that a sensor functions within an operating range typically specified by a manufacturer of the sensor. If circuitry is not properly employed to ensure a sensor stays in its operating range, then it is possible that a sensor may become saturated and the sensor output will not change appreciative in response to a changing input... Gamgee merely teaches the use of a compensating circuit so that operating point of the sensor is adjusted so as to prevent saturation. The compensating circuit is the subject of design before the circuit is constructed. In this respect, designers prevent the sensor from becoming saturated with the compensation circuit. There is no circuitry in Gamgee that actively detects the saturation level itself. Rather, at design time the saturation level of the sensor is known by the designers and circuitry is generated to prevent such from happening. As such, Gamgee does not show or suggest circuitry that actually detects the saturation level of a sensor as set forth by the various embodiments of the present invention."

The Examiner first asserts that the invention of Gamgee does not describe the interpretation by Appellant in which the designers of the circuitry provide a known saturation to prevent the saturation level from being reached. In fact, Gamgee specifically states:

"the sensing means being operable to generate an output signal of a magnitude related to the incident radiation up to a saturation level of the output signal, and increase in incident radiation level beyond a radiation level necessary to produce said saturation level do not produce significant changes in magnitude of the output sensing signal, the discriminating apparatus being operative over a range of radiation background signal intensities which can be sufficient to cause the output signal to reach the saturation level without adjustment of the operating point of the sensing means, the discriminating apparatus including a compensating circuit operative in response to any variation in background radiation[ ]intensity level within a desired range to adjust the operating point of the incident radiation sensing means so as to maintain the level of the sensing signal below the saturation level" (column 1, line 61 to column 2, line 10).

This section of Gamgee explicitly indicates that the apparatus is operative "to cause the output signal to reach the saturation level" and indicates that once this saturation level is detected, the compensating circuit will then be operative to maintain the signal below the saturation level.

The Examiner also maintains that the invention of Gamgee teaches a method for detecting saturation wherein a "sensing means 20 generates, in response to incident radiation 10, an output signal 21 of magnitude related to the incident radiation level up to a saturation level of the output signal 21, beyond which saturation level, any changes in incident radiation level do not produce significant changes in magnitude of the output sensing signal 21."

This section of Gamgee first indicates that the sensing means generates a first output signal related to a first incident radiation by stating that "in response to incident radiation 10, an output signal 21 of magnitude related to the incident radiation level" is produced.

This section of Gamgee then discloses that the sensing means generates a second output and a plurality of subsequent output signals, related to a second incident radiation and a plurality of subsequent incident radiations, and repeats the process up until a saturation level is detection, specifically, by generating a plurality of output signals in response to the plurality of input radiations "up to a saturation level of the output signal."

This section of Gamgee also discloses that the saturation level is detected by determining when a difference between the first and second incident radiation levels does not produce a significant difference between the magnitudes of the first and second output signals, specifically, by determining when "beyond which saturation level, any changes in incident radiation level do not produce significant changes in

magnitude of the output sensing signal 21" (i.e. there is no significant difference between two sequential output signal magnitudes).

Further, in order to determine whether the difference between the magnitudes of the first and second output signals is/is not significant, it is considered inherent that the difference must be compared to some type of threshold to indicate that the difference is/is not significant since in order to determine the significance of the difference, some measure of significance must be provided as a reference for comparison (i.e. a threshold).

Therefore, it can be seen that Gamgee does teach detecting saturation by comparing the difference a between a first measure of light output and a second measure of light output with a predetermined significance threshold. This teaching of Gamgee is consistent with the common means for detecting saturation in that it applies steadily increasing inputs to a sensor each time comparing a difference in the outputs of the sensor with a threshold to determine when the difference in output does not correspond an expected difference. This point in which the difference in output does not correspond to an expected difference threshold is the saturation point since a saturated sensor is at a maximum allowable input and cannot correctly respond to an additional increase in input.

Appellant also argues that:

"[t]he various embodiments of the present invention take into account that the sensors may include saturation points that vary over time. Gamgee fails to take this concept into account. Consequently, it is possible that the saturation point of a sensor of Gamgee might change over time and become saturated. Gamgee does

not address this possibility and, consequently, teaches away from the various embodiments of the present invention as set forth in claim 1."

The Examiner asserts that in the invention of Gamgee the saturation point is detected by determining a saturation level "beyond which saturation level, any changes in incident radiation level do not produce significant changes in magnitude of the output sensing signal 21." Therefore, each time the output signal is monitored for determining when a significant change is not produced, a new saturation level may be determined. Further, the Examiner asserts that while the invention of Gamgee does teach this situation, a lack of this teaching would not teach away from the claimed invention since there is nothing in the invention of Gamgee that teaches a feature contradicting to the invention as claimed.

Appellant then argues that the cited prior art teaches away from the claimed invention because:

"Gamgee teaches the generation of a constant analog signal from the sensor, not multiple readings as assumed by the Examiner. Gamgee does not generate a first output signal related to a first radiation and a second output related to a second radiation. Also, Gamgee does not repeat the process until saturation level is detected. Rather, Gamgee merely receives incident radiation and generates an output signal whereby, wherein the compensation circuit ensures that the sensor does not become saturated over time as the background noise of the incoming incident radiant light changes with time. Thus, in this respect, Gamgee teaches away from the concept of obtaining and comparing multiple measurements to determine saturation as set forth in the claims of the present invention. As a result, Applicants assert that any citation to Gamgee in rejecting the present claims can only be the product of hindsight reconstruction using the claims of the present application as a blueprint."

The Examiner first asserts that the invention of Gamgee does teach obtaining multiple readings of the sensor to generate a first output signal related to a first

radiation and a second output related to a second radiation and repeating the process until saturation is detected. Therefore, Appellant's arguments regarding a teaching away from these features are not persuasive.

Appellant's arguments regarding hindsight reconstruction is not persuasive since it has been held that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In the instant case, the invention of Lisson teaches an apparatus for calibrating a linear image sensor such as an array of sensors of a charge coupled device (column 1, lines 10-12) in a scanning apparatus (column 3, lines 1-2) including a light source (column 2, lines 61-63) controlled by a corresponding control circuit for applying first and second intensities of the light source at first and second times (column 3, lines 12-13) through the altering of voltage or current levels applied to the light source by predefined amounts (column 3, lines 42-45) to sequence the intensity of the of the light source from zero amplitude to a maximum level causing the image sensor to saturate (column 3, lines 45-49), wherein the image sensor array produces a corresponding first and second outputs based on the source intensity (column 3, lines 20-27).

Therefore while the invention of Lisson does disclose that altered currents are supplied by a control circuit to step the intensity of a light source until the saturation of the light sensor, Lisson does not specifically include a corresponding means for determining the occurrence of the saturation. Therefore, it would have been obvious to one having ordinary skill in the art to modify the invention of Lisson to include Gamgee's teaching for determining the occurrence of the saturation because Gamgee suggests that the combination would have provided a method for determining the saturation when an intensity is altered up to a saturation point (column 1, lines 61-64) by employing a common relationship (column 1, lines 64-68) thereby providing an accurate determination of when the maximum intensity has been reached.

Since this combination is suggested by the references themselves and does not include knowledge gleaned only from Appellant's disclosure, such a reconstruction is proper and not based on hindsight.

Appellant then argues that there is no motivation or combination to combine the references of Gamgee and Lisson because "Gamgee does not show or suggest the determination of saturation" and "Lisson teaches the fact that the current may be altered to a light source such that the intensity of the light source changes up to the point that saturation is achieved where no more differences occur event though greater intensities of light are created. Thus, there is no actual detection of a saturation point as described by Lisson. Rather Lisson merely discusses the fact

that sensors will become saturated when the intensity of the light that falls incident to the sensing surfaces is too great."

The Examiner asserts, that as noted above, Gamgee does disclose the determination of saturation.

Further, the Examiner asserts that the Final Office Action does not state that Lisson teaches "detection of a saturation point", but only that "altered currents are supplied by a control circuit to step the intensity of a light source until the saturation of the light sensor". The Examiner maintains that this feature is taught by specifically stating "[c]ontrol electronics 22 is programmed to supply a series of predetermined signals (voltage or current) levels that step light controller 24 through a series of operations which supply appropriate electrical control signals (voltage or current) levels which provide light level magnitudes corresponding to said signals. The control electronics 22 is programmed to provide a sequence of illuminance levels ranging from zero amplitude to some maximum level (e.g. the level at which image sensor 14 reaches saturation)" (column 3, lines 40-49).

The Examiner also maintains the motivation to combine the references as presented above.

Appellant then argues that:

"Uebbing merely teaches measuring the light output of LEDs at two separate times to determine a degradation of light output over the time period between measurements. In this respect, Uebbing is not detecting a 'percentage increase' between the two measurements, but the amount of degradation in the light output. In addition, Uebbing does not suggest determining 'the percentage increase, of the second measure relative to the first measure, needed to meet the desired output

level deviation/difference (in this case zero).' There is no 'desired output level deviation/difference' that is to be reached. Rather, the amount of light output degradation is determined between the measurements and the pulse width is adjusted to compensate. Applicants ask precisely where does Uebbing suggest the calculation of a percentage difference? Given that the degradation of the sensors over time is all that is measured, there is no need to calculate a percentage difference of the second measure relative to the first measure. The degradation is determined directly and the pulse width is adjusted to compensate. What would calculating a percentage difference accomplish? In this respect, Uebbing teaches away from calculating a percentage difference as claimed."

The Examiner first asserts that the combination of Lisson, Gamgee, and Shiota already teaches determining a difference between sensor output levels that is compared to a predetermined significance threshold to determine if saturation exists, as well as performing compensation by increasing and decreasing a driving signal. Therefore, the invention of Uebbing is only included to teach that the determination of the amount the current to be changed is made using percentages.

Uebbing teaches a method and apparatus for improving the uniformity of an LED printhead by compensating for the degradation in light output of a plurality of LEDs (column 4, lines 66-68) comprising obtaining the light output measures of two different pulse-width values and comparing the difference between these values to determine the percentage increase, of the second measure relative the first measure, needed to meet the desired output level deviation/difference (column 5, lines 1-22).

The Examiner asserts that this section of Uebbing explicitly describes determining an amount of degradation expressed as a percentage wherein the percentage is determined as the difference between q(t) and q(0), where q(t) and q(0) are the measures of light output at times t and 0, respectively.

This percentage degradation is expressed by the formula:

$$\text{Percentage degradation} = D_g = \left[1 - \frac{\varphi(t)}{\varphi(0)}\right] 100\%$$

which is explicitly the percentage difference between the light outputs obtained at the two different times determined by a percent difference of the second measure over the first measure.

Appellant then argues the combination of Uebbing with the other cited references.

The Examiner maintains that since the invention of Lisson in combination with Gamgee and Shiota teaches incrementing/decrementing the current in order to obtain an optimum value, it would have been obvious to one having ordinary skill in the art to modify the invention of Lisson, Gamgee, and Shiota to include determining the amount the current is to be changed using percentages, as taught by Uebbing, because Uebbing suggests a method that would quickly and accurately determine the required change in intensity, and corresponding current modification, using a functionally equivalent method in order to adjust the light output to the optimum/desired value of Lisson, Gamgee, and Shiota (column 5, lines 1-32).

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

jrw JRW

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